

## Work Motivation Research Based on Self-Determination Theory: Trajectory and Future Directions

**Authors:** Zhang Chunhu

**Date:** 2019-03-29T00:00:00+00:00

### Abstract

A systematic search of English-language literature on work motivation based on Self-Determination Theory up to May 2018 yielded a sample of 97 empirical studies. Based on the core assumptions of Self-Determination Theory and employing the theoretical model of “environment–basic psychological needs–work motivation–outcomes,” the research trajectories concerning antecedents and outcomes of work motivation were carefully analyzed and synthesized. The results indicate that satisfaction of employees’ basic psychological needs and autonomous work motivation, as mediating variables, can explain the positive effects of autonomy-supportive work environments and employee individual characteristics on work behaviors, attitudes, and psychological well-being. Future main research topics include: first, research on the effects of specific factors in controlling work environments on the thwarting of employees’ basic psychological needs, controlled motivation and amotivation, as well as employees’ work behaviors, attitudes, and psychological well-being; second, research on the processes through which different motivation types influence employee performance, behaviors, and attitudes, as well as contextual factors; and third, in-depth research on the effects of external rewards (including compensation, performance-based rewards, etc.) on employee work motivation, basic psychological needs, work performance, and psychological well-being, along with boundary conditions.

### Full Text

#### Streams and Future Directions of Research on Work Motivation Based on the Self-Determination Theory

School of Management, Guangdong University of Technology,  
Guangzhou 510520, China

**Abstract:** A systematic search of English-language literature on work motivation based on self-determination theory yielded 97 empirical studies published before May 2018. Grounded in the core hypotheses of self-determination theory, this paper employs a theoretical framework of “environment—basic psychological needs—work motivation—outcomes” to carefully analyze and synthesize research streams examining antecedents and consequences of work motivation. The results demonstrate that employees’ basic psychological need satisfaction and autonomous work motivation serve as mediating variables that explain the positive effects of autonomy-supportive work environments and individual characteristics on work behaviors, attitudes, and mental health. Future research should focus on three main areas: first, investigating how specific factors in controlling work environments affect employees’ basic psychological need thwarting, controlled motivation, and amotivation, as well as their impact on work behaviors, attitudes, and mental health; second, examining the processes through which different motivation types influence employee performance, behaviors, and attitudes, including contextual factors; and third, conducting in-depth studies on the effects of external rewards (including compensation and performance-based incentives) on employee work motivation, basic psychological needs, work performance, and mental health, along with their boundary conditions.

**Keywords:** self-determination theory; basic psychological need satisfaction (thwarting); work motivation; research streams

**Classification Codes:** B849:C93; F272.92

## 1. Introduction

Work motivation has long been a central concern for organizational managers and one of the most extensively researched topics in organizational studies (Pinder, 2008). In the 1970s, based on experimental research examining how external rewards affect intrinsic motivation, Deci and Ryan integrated theories of human internalization and causality orientations to propose self-determination theory (SDT) in 1985 (Deci & Ryan, 1985a). Since then, the theory has been widely applied in educational psychology, sports psychology, and health psychology.

Although self-determination theory was not originally developed specifically for work motivation, its initial conclusion that external rewards may undermine intrinsic motivation (Deci, Koestner, & Ryan, 1999) challenged the traditional view that intrinsic and extrinsic work motivation have additive effects. It also questioned organizational management practices that rely primarily on material rewards to motivate employees, which are based on behaviorist and economic theories. Furthermore, SDT moved beyond the conventional dichotomy of intrinsic versus extrinsic motivation by identifying distinct types of motivation for human activities and proposing that various motivations involve different psychological processes with different antecedents and outcomes, thereby providing a new theoretical framework for work motivation research.

The applicability of self-determination theory to work motivation in organiza-

tional management has also faced skepticism from scholars. In response, Deci, Connell, and Ryan began applying SDT to organizational intervention studies in 1989, with subsequent research following suit. In 2005, Gagné and Deci's landmark theoretical review proposed a research model for work motivation based on self-determination theory and identified specific research questions, which greatly advanced related research and led to a substantial increase in the number of studies.

Over the past three decades, what progress has been made in work motivation research based on self-determination theory? What contributions has this research made to the study of work motivation? What important issues require further investigation? These are pressing questions that need answers. Although Deci, Olafsen, and Ryan's (2017) review provided detailed explanations of relationships among important variables, it did not systematically search the literature nor carefully organize and synthesize research streams. Domestic scholars Liu, Zhong, and Si (2013) focused on analyzing the application of self-determination theory across various life domains in Chinese populations but did not conduct a systematic analysis specifically targeting work motivation research. Zhang, Zhang, Li, and Deci's (2010) review focused on analyzing and synthesizing the theoretical and applied value of work motivation within the SDT framework, but covered limited literature and did not carefully organize and summarize research streams. Therefore, the primary purpose of this paper is to systematically review and analyze research streams on work motivation within the self-determination theory framework, summarize research findings, clarify future research directions, and provide reference and guidance for work motivation research and management practice based on Chinese cultural contexts.

## 2.1. Motivation Types in Self-Determination Theory

The most distinctive feature of self-determination theory is its identification of three types of motivation for human activities: intrinsic motivation, extrinsic motivation, and amotivation. Intrinsic motivation refers to engaging in activities out of personal interest and enjoyment derived from the activity itself. Extrinsic motivation refers to engaging in activities to obtain separable outcomes. Amotivation refers to the lack of intention to engage in activities (Ryan & Deci, 2000a).

Self-determination theory further distinguishes different types of extrinsic motivation. SDT posits that humans have an innate tendency to absorb, assimilate, and integrate socially approved behaviors, values, and norms. Due to individual differences in the degree of internalization and integration of these external behaviors, values, and norms, people may exhibit different types of extrinsic motivation when engaging in non-intrinsically motivated behaviors: external regulation, introjected regulation, identified regulation, and integrated regulation. External regulation refers to motivation dependent on external conditions, engaging in activities to obtain instrumental outcomes. Introjected regulation

refers to motivation where individuals absorb external norms or values but have not fully assimilated them, engaging in activities to avoid anxiety or guilt or to enhance self-esteem. Identified regulation refers to motivation where individuals identify with the value of their activities and feel the activity is important to them. Integrated regulation refers to motivation where individuals identify with the value of activities and integrate them as part of their self-value (Ryan & Deci, 2000b).

Based on the degree of autonomy of different extrinsic motivation types, Ryan and Deci (2000b) arranged extrinsic motivation types on a continuum from least autonomous (external regulation) to partially autonomous (introjected regulation), fully autonomous (identified regulation), and completely autonomous (integrated regulation), culminating in intrinsic motivation. Accordingly, Ryan and Deci proposed two types of motivation: autonomous motivation and controlled motivation. Autonomous motivation refers to motivation characterized by a full sense of willingness, volition, and choice when engaging in activities, including intrinsic motivation and the two extrinsic motivation types of integrated and identified regulation. Controlled motivation refers to motivation characterized by a sense of being forced or controlled by external conditions or internal psychology when engaging in activities, including the two extrinsic motivation types of external and introjected regulation.

## 2.2. Core Hypotheses of Self-Determination Theory

Self-determination theory posits that three basic psychological needs—autonomy, competence, and relatedness—are essential conditions for individual psychological growth, internalization, and mental health. “Autonomy need” refers to individuals’ experience of psychological freedom to engage in activities according to their own will and choice. “Competence need” refers to individuals’ experience of mastery and ability development in their environment. “Relatedness need” refers to individuals’ experience of connection with others, loving and caring for others, and being loved and cared for (Ryan & Deci, 2017).

The core hypothesis of self-determination theory is that when organizational environments satisfy employees’ three basic psychological needs for autonomy, competence, and relatedness, employees experience a sense of willingness, volition, and choice in their work activities, which enhances or maintains autonomous motivation. Consequently, behaviors become more persistent and of higher quality, ultimately producing more effective behavioral outcomes and promoting individual mental health. Conversely, when individuals’ three basic psychological needs are thwarted, employees experience a stronger sense of being controlled in their work activities, exhibiting stronger controlled motivation or amotivation. In such cases, individuals focus more on external outcomes, producing negative effects on behavioral outcomes and engagement levels (Gagné & Deci, 2005).

### 2.3. Operationalization and Measurement of Work Motivation Based on Self-Determination Theory

Various self-report scales have been developed for work motivation in workplace settings, though the motivation types included in each scale are not consistent. For example, the French version of the Blais Inventory of Work Motivation (Blais, Brière, Lachance, Riddle, & Vallerand, 1993) is a 31-item Likert scale including four motivation types: intrinsic motivation, identified regulation, introjected regulation, and external regulation. The English version of the Work Extrinsic and Intrinsic Motivation Scale (Tremblay, Blanchard, Taylor, Pelletier, & Villeneuve, 2009) is an 18-item Likert scale including six motivation types: intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation, and amotivation. Gagné et al.'s (2010) English and French versions of the Motivation at Work Scale consist of 12 Likert items including four types: intrinsic motivation, identified regulation, introjected regulation, and external regulation. Gagné et al. (2015) revised the original scale and developed a new Multidimensional Work Motivation Scale based on seven languages and nine cultural contexts, a 19-item Likert scale including five motivation types: intrinsic motivation, identified regulation, introjected regulation, external regulation, and amotivation.

Empirical research currently employs three operationalization strategies for work motivation. First, treating various motivation type measurements as independent variables to examine their relationships with other relevant variables, as in studies by Beek, Hu, Schaufeli, Taris, and Schreurs (2012) and Zhang, Zhang, Song, and Gong (2016). Second, performing arithmetic operations on work motivation type measurements to synthesize new motivation indices or types. Many studies currently combine “intrinsic motivation” and “identified regulation” into “autonomous work motivation,” and combine “external regulation” and “introjected regulation” into “controlled work motivation,” to compare the differential effects of these two motivation types or their antecedent variables, as in studies by Tremblay et al. (2009) and Gillet, Gagné, Sauvagère, and Fouquereau (2013). Some studies assign corresponding weights to each motivation type based on the continuum model of work motivation to calculate the “Relative Autonomy Index (RAI)” and use this index to predict variance in relevant variables. For example, Deci, Connell, and Ryan (1989) calculated the RAI using the formula:  $2 \times \text{intrinsic motivation} + \text{identified regulation} - \text{introjected regulation} - 2 \times \text{external regulation}$ .

Third, based on the assumption that various motivation types coexist simultaneously and may produce interactive effects, cluster analysis or latent profile analysis is used to distinguish groups formed by natural combinations of different motivation types, and then examine differences in behavioral outcomes and antecedent variables among different groups, as in studies by Broeck, Lens, Witte, and Coillie (2013) and Gillet, Becker, Lafrenière, Huart, and Fouquereau (2017).

### 3.1. Sample Selection

To comprehensively and systematically review previous research findings, we searched for literature published before May 2018. To ensure objective and accurate analysis and synthesis of work motivation research streams, we employed the following sample selection procedure:

**Step 1:** We conducted advanced searches in three major databases: Web of Science, EBSCO, and PsycINFO. Search terms included “Self-determination theory,” “self-determined motivation,” and one of the following: “Work motivation,” “employees motivation,” “autonomous motivation,” “controlled motivation,” or “amotivation.” The search was limited to peer-reviewed English literature published before May 2018, excluding studies on “Students’ motivation” and literature types such as “editorials, books, reviews, and clinical trials.” This yielded 701 eligible study samples.

**Step 2:** We read the abstracts of the samples obtained from Step 1, removed duplicate literature, and applied additional screening criteria. First, studies must focus on employees or workers in various organizations. Second, studies must be empirical research based on self-determination theory (including cross-sectional, longitudinal, experimental, and quasi-experimental designs). Third, study samples must examine relationships between at least one motivation type from self-determination theory and antecedent or outcome variables, and must provide correlation coefficients between variables. Fourth, studies must report clear sample sizes and variable reliability.

**Step 3:** To avoid omissions, we carefully examined reference lists of highly cited samples (from Web of Science search results) as a supplementary source.

Through these three steps, we ultimately obtained 97 sample articles (see references marked with \*).

### 3.2. Analysis Methods

Self-determination theory has established a theoretical model of “environment—basic psychological needs—work motivation—outcomes.” Accordingly, to integrate existing empirical research, we propose a comprehensive research model (see Figure 1 [Figure 1: see original paper], where A represents four types of autonomy-supportive environmental factors and B represents three types of work motivation). The model in Figure 1 categorizes work environmental factors into autonomy-supportive and controlling environments as independent variables, with basic psychological need satisfaction (or thwarting) and three motivation types (autonomous motivation, controlled motivation, and amotivation) as mediating variables to explain the impact of work environments on employees. Meanwhile, empirical research indicates that employee individual characteristics directly affect basic psychological need satisfaction and work motivation, thus also serving as antecedent variables. Thick solid lines in the figure

indicate relationships with more research literature, while thin solid lines indicate relationships with less research literature.

### Figure 1. Research Model of Work Motivation Based on Self-Determination Theory

The model depicts: (A) Autonomy-supportive environment including work characteristics, leadership styles, autonomy-supportive interpersonal climate, and perceived organizational support; (B) Work motivation comprising autonomous, controlled, and amotivation types; with basic psychological need satisfaction/thwarting as mediators influencing outcomes including work performance, behaviors (effort, engagement, organizational citizenship), attitudes (satisfaction, commitment, turnover intention), and mental health (burnout, anxiety). Individual characteristics (causality orientations, work goals/values) also influence the process. Thick lines indicate well-documented relationships; thin lines indicate less-researched relationships.

Based on classification and synthesis of antecedent variables in the 97 sample articles, autonomy-supportive environmental factors primarily concentrate in four aspects: work characteristics, leadership styles, autonomy-supportive interpersonal climate, and perceived organizational support. Controlling environments mainly focus on four aspects: negative supervisor behaviors, workplace bullying, negative job characteristics, and employees' perceptions of organizational politics. Individual characteristics include general causality orientations and personal work goals or work value orientations. Work motivation outcome variables include employee work performance, work behaviors (work effort, persistence, engagement, organizational citizenship behavior), work attitudes (job satisfaction, organizational commitment), and mental health indicators (burnout, work stress, and anxiety).

From the classification and synthesis of the 97 sample articles regarding research design and variables involved, we identified six main research streams: **Stream 1** examines the main effects of different work motivations, testing the predictive effects of autonomous, controlled, and amotivation on employee work behaviors and attitudes. **Stream 2** investigates the impact of basic psychological need satisfaction on employee work motivation and work behaviors, attitudes, and mental health, testing whether satisfaction of the three basic psychological needs serves as psychological conditions promoting employee growth and positive behaviors. **Stream 3** explores how autonomy-supportive work environments affect employee work behaviors, attitudes, and mental health through work motivation, testing whether work motivation mediates the effects of autonomy-supportive environments. **Stream 4** examines how autonomy-supportive work environments affect employee work behaviors, attitudes, and mental health through basic psychological need satisfaction, testing whether need satisfaction mediates these effects. **Stream 5** investigates the psychological processes through which controlling work environments affect employee work behaviors and attitudes, testing whether work motivation and basic psychological need satisfaction (or thwarting) mediate the effects of controlling environments. **Stream**

6 studies how employee individual characteristics affect employee work behaviors, attitudes, and mental health through basic psychological need satisfaction (or thwarting) or work motivation, testing the psychological processes through which individual characteristics influence employees.

### 3.3.1. Stream 1: Main Effects Research on Work Motivation

#### (1) Effects of Autonomous Work Motivation on Employees (Link 8–11)

Link 8–11 (16 study samples) yielded consistent conclusions that autonomous work motivation positively predicts positive employee work behaviors, attitudes, and mental health. Cross-sectional or longitudinal studies across different occupational samples show that autonomous work motivation positively predicts job satisfaction (Battistelli, Galletta, Portoghese, & Vandenberghe, 2013; Gillet, Fouquereau, Lafrenière, & Huyghebaert, 2016; Ilardi, Leone, Kasser, & Ryan, 1993; Nencini, Romaioli, & Meneghini, 2016; Tremblay et al., 2009), work effort (Bidee et al., 2013; Gagné et al., 2015), work vitality (Gagné et al., 2015), work engagement (Beek, Taris, & Schaufeli, 2011; Broeck et al., 2011; Lopes & Chambel, 2017), career commitment (Fernet, Austin, & Vallerand, 2012), affective commitment (Battistelli et al., 2013; Gagné et al., 2015; Gagné, Chemolli, Forest, & Koestner, 2008; Tremblay et al., 2009), organizational citizenship behavior (Battistelli et al., 2013; Roche & Haar, 2013; Tremblay et al., 2009), and retention intention (Li, Wu, & Ying, 2016). Autonomous work motivation negatively predicts turnover intention (Battistelli et al., 2013; Gagné et al., 2015), work anxiety (Gillet et al., 2016), and work stress (Tremblay et al., 2009). However, the predictive effect of autonomous work motivation on burnout has produced contradictory conclusions, with some studies finding that autonomous work motivation negatively predicts employee burnout (Broeck et al., 2011; Gagné et al., 2015; Fernet et al., 2012), while others find no relationship between autonomous work motivation and employee burnout (Lopes & Chambel, 2017).

Stream 1 (1 study sample) also indicates that the Relative Autonomy Index positively predicts employee job satisfaction and organizational commitment, while negatively predicting work stress and turnover intention (Tremblay et al., 2009). Stream 1 (4 study samples) cluster analysis or latent profile analysis of work motivation also shows that regardless of whether controlled motivation levels are high or low, the “high autonomous motivation group” exhibits higher job satisfaction, work passion, work engagement, and organizational commitment, as well as lower work stress, burnout, and negative affect than the “low autonomous motivation group” (Broeck et al., 2013; Gillet et al., 2017; Graves, Cullen, Lester, Ruderman, & Gentry, 2015; Howard, Gagné, Morin, & Anja, 2016).

#### (2) Effects of Controlled Work Motivation on Employees (Link 9–11)

Link 9–11 (9 study samples) has not yielded consistent conclusions. Some studies find that controlled work motivation positively predicts employee burnout and turnover intention (Beek et al., 2012; Gagné et al., 2015; Fernet et al., 2012), and negatively predicts job satisfaction (Gillet et al., 2016), organizational citizenship behavior (Roche & Haar, 2013), and retention intention (Li et al., 2016). However, other studies find no relationship between controlled work motivation and employee burnout (Lopes & Chambel, 2017), work effort (Bidee et al., 2013), or turnover intention (Battistelli et al., 2013). Stream 1 cluster analysis or latent profile analysis (3 study samples) reveals that when autonomous motivation constitutes the main component of the motivation profile, the level of controlled motivation does not produce incremental effects on employee job satisfaction, work passion, work engagement, and organizational commitment (Broeck et al., 2013; Gillet et al., 2017; Graves et al., 2015).

### **(3) Effects of Amotivation on Employees (Link 10–11)**

Link 10–11 (2 study samples) yielded consistent conclusions that amotivation negatively predicts employee retention intention (Li et al., 2016), work vitality, and work effort, while positively predicting emotional exhaustion and turnover intention (Gagné et al., 2015). Stream 1 cluster analysis (1 study sample) also shows that the “amotivation profile group” (very high amotivation with below-average intrinsic motivation, identified regulation, introjected regulation, and external regulation) exhibits the lowest levels of in-role and extra-role performance, job satisfaction, and work engagement (Howard et al., 2016). However, the predictive effect of amotivation on organizational commitment has produced contradictory conclusions, with one study finding that amotivation negatively predicts affective commitment (Gagné et al., 2015), while another finds that amotivation positively predicts teachers’ affective commitment (Imran, Allil, & Mahmoud, 2017).

### **(4) Effects of Autonomous and Controlled Work Motivation on Employee Work Performance**

Gagné and Deci (2005) proposed that “autonomous and controlled work motivation may have different effects on work performance,” though research on this question remains limited. Educational research finds that for simple, routine tasks, controlled motivation promotes short-term performance better than autonomous motivation, whereas for complex and creative work, autonomous motivation better promotes behavioral persistence and performance improvement (Grolnick & Ryan, 1987). Cluster analysis of work motivation indicates that groups with high levels across all five motivation types (external regulation, introjected regulation, identified regulation, integrated regulation, and intrinsic motivation) exhibit the highest role performance levels (Moran, Diefendorff, Kim, & Liu, 2012). These studies preliminarily suggest that autonomous and controlled motivation may have additive or interactive effects on work performance, and these effects may be influenced by task characteristics, though consistent conclusions have not yet emerged.

### **(5) Differential Effects of Different Types of Autonomous Work Motivation**

Whether intrinsic motivation and autonomous extrinsic motivation (identified and integrated regulation) have differential effects on employees remains inconclusive. Gagné and Deci (2005) proposed that “autonomous extrinsic motivation (identified and integrated regulation) and intrinsic motivation have different psychological mechanisms and may produce different effects on employees.” Laboratory and field studies in educational settings show that regardless of task performance, intrinsic motivation positively predicts students’ mental health, while identified regulation positively predicts task performance, and its effect on mental health depends on task performance levels (Burton, Lydon, Alessandro, & Koestner, 2006). Koestner and Losier (2002) found in educational settings that the effects of intrinsic motivation and identified regulation on behavioral performance may be moderated by task characteristics: when students engage in uninteresting tasks requiring self-discipline and sustained effort, identified regulation more strongly predicts task performance; when students engage in interesting tasks, intrinsic motivation more strongly predicts performance. Currently, only Zhang et al. (2016) have used both cross-sectional and longitudinal methods to examine relationships between Chinese employees’ intrinsic motivation, identified regulation, introjected regulation, and external regulation and employee performance, finding that only identified regulation positively predicts relational and adaptive performance, consistent with Burton et al.’s conclusions.

### **3.3.2. Stream 2: Research on Effects of Basic Psychological Need Satisfaction on Work Motivation and Work Behaviors and Attitudes**

#### **(1) Research on Direct Relationships Between Basic Psychological Need Satisfaction (Thwarting) and Different Motivation Types**

Link 6–8 (10 study samples) yielded consistent conclusions that employee basic psychological need satisfaction positively predicts autonomous work motivation. First, intervention studies show that employee basic psychological need satisfaction is an antecedent of autonomous motivation, enhancing autonomous work motivation (Lynch, Plant, & Ryan, 2005). Second, longitudinal studies reveal time-lagged effects of basic psychological need satisfaction on autonomous work motivation (Olafsen, Deci, & Halvari, 2018). Third, cross-sectional studies demonstrate positive correlations between employee basic psychological need satisfaction and intrinsic motivation (Dysvik, Kuvaas, & Gagné, 2013; Longo, Gunz, Curtis, & Farsides, 2016; Rasskazova, Ivanova, & Sheldon, 2016; Vandercammen, Hofmans, & Theuns, 2014) and autonomous motivation (Broeck, Ferris, Chang, & Rosen, 2016; Broeck, Vansteenkiste, Witte, Soenens, & Lens, 2010; Gagné et al., 2015). Fourth, cluster analysis of work motivation also shows significant positive correlations between employee basic psychological need satisfaction and autonomous work motivation (Moran et al., 2012).

Link 6–9 (4 study samples) produced contradictory conclusions. Some studies find negative correlations between employee basic psychological need satisfaction and controlled motivation (Broeck et al., 2010), while others find no relationship (Haivas, Hofmans, & Pepermans, 2013; Gagné et al., 2015). Broeck et al.'s (2016) meta-analysis also found weak predictive effects of employee basic psychological need satisfaction on controlled motivation.

Link 6–10 (2 study samples) preliminarily concludes that employee basic psychological need satisfaction negatively correlates with amotivation (Broeck et al., 2016; Gagné et al., 2015).

Link 7–8 includes only one study showing that employee basic psychological need thwarting negatively correlates with intrinsic motivation (Longo et al., 2016). Links 7–9 and 7–10, based on sports domain research, indicate that athletes' basic psychological need thwarting positively correlates with controlled motivation and amotivation (Martinent, Guillat-Descas, & Moiret, 2015), though empirical evidence regarding the direct relationship between basic psychological need thwarting and controlled work motivation or amotivation among workplace employees remains lacking.

## **(2) Research on Effects of Employee Basic Psychological Need Satisfaction on Work Motivation and Work Behaviors and Attitudes**

Link 6–8–11 (3 study samples) yielded consistent conclusions that autonomous work motivation as a mediating variable partially explains the positive effects of employee basic psychological need satisfaction on work behaviors, attitudes, and mental health. First, cross-sectional studies show that autonomous work motivation mediates the positive effect of employee basic psychological need satisfaction on work engagement (Haivas et al., 2013). Second, cross-sectional studies demonstrate that the Relative Autonomy Index as a mediator partially explains the positive effects of employee basic psychological need satisfaction on job satisfaction (Richer, Blanchard, & Vallerand, 2002), positive affect, and vitality (Milyavskaya & Koestner, 2011), as well as the negative effects on burnout and turnover intention (Richer et al., 2002).

No studies have examined controlled work motivation or amotivation as mediators explaining the effects of employee basic psychological need satisfaction on work behaviors and attitudes in Link 6–9–11 and Link 6–10–11.

Preliminary research in Link 7–8–11, Link 7–9–11, and Link 7–10–11 shows that the Relative Autonomy Index as a mediator can explain the negative effects of employee basic psychological need thwarting on emotional exhaustion (Silva et al., 2017), though no studies have examined autonomous motivation, controlled motivation, or amotivation as mediators explaining the effects of employee basic psychological need thwarting on work behaviors and attitudes.

### 3.3.3. Stream 3: Effects of Autonomy-Supportive Work Environment on Work Motivation and Work Behaviors and Attitudes

Self-determination theory emphasizes the impact of social environments on individual motivation and proposes the concept of “autonomy-supportive environment,” defined as “environments that encourage individuals’ free choice and autonomous experience” (Deci & Ryan, 1987). Current research has extensively examined four categories of factors: interpersonal relationship climate in work environments (including manager/supervisor autonomy support and team member autonomy support), manager leadership styles, employee perceived organizational support, and job characteristics.

#### (1) Manager (Supervisor) Autonomy Support, Work Motivation, and Outcomes

Manager (supervisor) autonomy support refers to interpersonal behaviors that motivate subordinates when managers perform management functions, including valuing subordinates’ different opinions, providing choice opportunities and meaningful feedback, encouraging proactive action, assigning optimally challenging tasks, and providing rationales for tasks (Deci et al., 1989).

Link 3.1–8–11 (12 study samples) yielded consistent conclusions that manager (supervisor) autonomy support positively affects subordinates’ work motivation, work behaviors, work attitudes, and mental health. First, intervention studies show that manager (supervisor) autonomy support positively impacts subordinates’ autonomous work motivation and work engagement (Hardré & Reeve, 2010). Second, longitudinal and cross-sectional studies find that manager (supervisor) autonomy support positively predicts subordinates’ intrinsic work motivation (Güntert, 2015; Kuvaas, 2008; Nie, Chua, Yeung, Ryan, & Chan, 2015; Pelletier, Fortier, Vallerand, & Brière, 2001), Relative Autonomy Index (Otis & Pelletier, 2005; Williams, Halvari, Niemiec, Olafsen, & Westbye, 2014), and autonomous work motivation (Gillet, Gagné, et al., 2013; Güntert, 2015; Haivas et al., 2013; Nie et al., 2015; Oostlander, Güntert, & Wehner, 2014; Pelletier et al., 2001; Schie, Güntert, Oostlander, & Wehner, 2015). In relationships between manager (supervisor) autonomy support and work behaviors and attitudes, intrinsic work motivation as a mediator positively predicts work performance (Kuvaas, 2008), job satisfaction (Güntert, 2015; Nie et al., 2015), and organizational citizenship behavior (Güntert, 2015). The Relative Autonomy Index as a mediator positively predicts employee retention intention (Otis & Pelletier, 2005). Autonomous work motivation as a mediator positively predicts job satisfaction (Gillet, Gagné, et al., 2013; Oostlander et al., 2014), behavioral persistence (Pelletier et al., 2001), work engagement, and organizational citizenship behavior (Schie et al., 2015). Third, current research also shows that employee autonomous work motivation partially explains the buffering effects of manager (supervisor) autonomy support on employee psychological disorders, including perceived stress, physical symptoms, emotional exhaustion (Williams

et al., 2014), daily psychological distress (Otis & Pelletier, 2005), and turnover intention (Gillet, Gagné, et al., 2013; Williams et al., 2014).

Link 3.1–9–11 (4 study samples) produced inconsistent conclusions. Some studies find that manager (supervisor) autonomy support negatively predicts employee external regulation, which as a mediator negatively predicts employee satisfaction and positively predicts work stress (Nie et al., 2015), while other studies find no relationship between manager (supervisor) autonomy support and subordinates' external regulation (Güntert, 2015; Pelletier et al., 2001) or controlled work motivation (Gillet, Gagné, et al., 2013).

Link 3.1–10–11 (3 study samples) preliminarily concludes that manager (supervisor) autonomy support negatively predicts employee amotivation, which as a mediator negatively predicts behavioral persistence (Pelletier et al., 2001), and positively predicts turnover intention (Güntert, 2015), work stress, and physical symptoms (Nie et al., 2015).

## **(2) Team Member Autonomy Support, Work Motivation, and Outcomes**

The self-determination theory framework has also been applied to team effectiveness research, proposing the concept of “team member autonomy support,” defined as team members valuing each other's different opinions, providing choice opportunities and meaningful feedback, and mutually encouraging work according to one's own will (Moreau & Mageau, 2012; Jungert, Koestner, Houliort, & Schattke, 2013).

Link 3.2–8–11 (4 study samples) reveals positive effects of team member autonomy support on members' autonomous work motivation, work behaviors, work attitudes, and mental health. First, intervention studies show that team member autonomy support significantly enhances team members' basic psychological need satisfaction and autonomous work motivation (Jungert, Broeck, Schreurs, & Osterman, 2018). Second, cross-sectional and longitudinal studies also find that team member autonomy support positively predicts team members' autonomous work motivation (Hon, 2012; Jungert et al., 2013; Liu, Zhang, Wang, & Lee, 2011), which as a mediator positively predicts creative performance (Hon, 2012) and negatively predicts voluntary turnover (Liu et al., 2011). No studies have examined the buffering effects of team member autonomy support on members' controlled motivation or amotivation in Link 3.2–9–11 and Link 3.2–10–11.

## **(3) Leadership Styles, Work Motivation, and Outcomes**

Gilbert and Kelloway (2014) suggest that managers' transformational leadership, leader-member exchange, authentic leadership, and charismatic leadership have the potential to satisfy subordinates' three basic psychological needs, enhance and maintain intrinsic motivation, and promote internalization and integration of extrinsic motivation, thereby affecting employee work motivation and work behaviors, attitudes, and mental health.

First, Link 2.1–8–11 (5 study samples) in cross-sectional or longitudinal studies shows that supervisors' transformational leadership style positively predicts subordinates' intrinsic work motivation (Conchie, 2013; Piccolo & Colquitt, 2006) and autonomous work motivation (Bono & Judge, 2003; Eyal & Roth, 2011; Fernet, Trépanier, Austin, Gagné, & Forest, 2015; Wang & Gagné, 2013), with intrinsic or autonomous work motivation as mediators positively predicting subordinates' job satisfaction (Bono & Judge, 2003), work performance and organizational citizenship behavior (Fernet et al., 2015; Piccolo & Colquitt, 2006), and affective commitment (Bono & Judge, 2003; Fernet et al., 2015), while negatively predicting burnout (Eyal & Roth, 2011) and perceived work stress (Fernet et al., 2015). Correspondingly, Link 2–9–11 shows that transactional leadership style positively predicts subordinates' burnout through the partial mediation of controlled motivation (Eyal & Roth, 2011).

Second, Link 2.2–8–11 (3 study samples) in cross-sectional studies shows that perceived leader-member exchange quality positively predicts autonomous work motivation, which as a mediator positively predicts job satisfaction, life satisfaction, health perception, subjective vitality, affective commitment, and work engagement, while negatively predicting burnout (Chambel, Castanheira, Oliveira-cruz, & Lopes, 2015; Graves & Luciano, 2013; Pauli, Chambel, Capelari, & Rissi, 2017). Only Chambel et al. (2015) in Link 2.2–9–11 found no relationship between leader-member exchange quality and employee controlled motivation.

Third, Link 2–8–11 includes a few studies examining other leadership styles' effects on employee work motivation and work behaviors and attitudes. Cross-sectional studies find that servant leadership style positively predicts subordinates' autonomous work motivation, which as a mediator positively predicts personal growth, positive relationships, environmental mastery, and self-acceptance (Chen, Chen, & Li, 2013). Cross-sectional studies also find that employee autonomous work motivation plays an important mediating role between managers' developmental leadership style and employee organizational citizenship behavior (Zhang & Chen, 2013). Another cross-sectional study reveals that intrinsic motivation mediates the relationship between employees' perceived ethical leadership style and innovative work behavior (Tu & Lu, 2013). Preliminary research in Link 2–9–11 finds that servant leadership style negatively predicts employee mental health through external regulation (Chen et al., 2013). No studies in Link 2–10–11 have examined leadership styles' effects on employee amotivation.

#### **(4) Perceived Organizational Support, Work Motivation, and Outcomes**

Perceived organizational support is an important organizational factor affecting employee work behaviors, attitudes, and mental health that has received widespread support (Eisenberger & Stinglhamber, 2011). Scholars have applied the self-determination theory framework to explore the psychological processes through which employees' perceived organizational support affects work behaviors, attitudes, and mental health.

Link 4–8–11 (4 study samples) in cross-sectional studies shows that employee perceived organizational support positively predicts autonomous work motivation, which as a mediator positively predicts work engagement (Chambel et al., 2015), job satisfaction (Gillet, Gagné, et al., 2013), life satisfaction, and health perception (Pauli et al., 2017), while negatively predicting burnout (Chambel et al., 2015) and turnover intention (Gillet, Gagné, et al., 2013). The Relative Autonomy Index also partially mediates the relationship between perceived organizational support and employee engagement (Gillet, Huart, Colombat, & Fouquereau, 2013).

Link 4–9–11 (2 study samples) produced inconsistent conclusions. Gillet, Gagné, et al.'s (2013) cross-sectional study finds that employee perceived organizational support positively predicts controlled motivation, which as a mediator negatively predicts job satisfaction and positively predicts turnover intention. Chambel et al.'s (2015) cross-sectional study finds that although employee controlled motivation positively predicts burnout and negatively predicts work engagement, employee perceived organizational support is unrelated to controlled motivation. No research in Link 4–10–11 has examined the relationship between employee perceived organizational support and amotivation.

#### **(5) Effects of Job Characteristics on Employee Work Motivation and Work Behaviors and Attitudes**

The Job Characteristics Model (JCM) posits that optimizing five characteristics—task significance, task identity, skill variety, feedback, and autonomy—enables employees to experience meaningfulness and responsibility in work and understand work results, thereby enhancing internal work motivation (Hackman & Oldham, 1980). Self-determination theory also suggests that core job characteristics can satisfy employees' three basic psychological needs, enhance and maintain intrinsic motivation, and promote internalization and integration of extrinsic motivation (Deci & Ryan, 2000b).

Link 1.1–8–11 (7 study samples) in cross-sectional studies demonstrates the motivational potential of JCM's five core job characteristics. First, the "job autonomy" characteristic positively predicts employees' intrinsic work motivation, which as a mediator positively predicts affective commitment and in-role performance while negatively predicting turnover intention (Galletta, Portoghese, & Battistelli, 2011; Joo, Jeung, & Yoon, 2010; Kuvaas, 2008). Second, three job characteristics (task significance, job feedback, and skill variety) or all five core characteristics positively predict the Relative Autonomy Index, which as a mediator positively predicts job satisfaction (Millette & Gagné, 2008; Richer et al., 2002) while negatively predicting burnout and turnover intention (Richer et al., 2002). Third, the five core characteristics positively predict autonomous work motivation, which as a mediator positively predicts job satisfaction, organizational citizenship behavior (Güntert, 2015), and work engagement (Schie et al., 2015).

The Job Demands-Resources (JD-R) Model has verified the direct effects of job demands and job resources on employee engagement and burnout (Demerouti, Nachreiner, Bakker, & Schaufeli, 2001), while recent research based on self-determination theory further explores the motivational processes through which job demands and resources affect employee work behaviors and attitudes. Link 1.2–8–11 (3 study samples) shows that job resources positively affect employee work behaviors and attitudes through autonomous work motivation. First, longitudinal research finds that job resources (job control, job recognition, and colleague relationships) positively predict employees' autonomous work motivation, which produces positive lagged effects on career commitment and negative lagged effects on emotional exhaustion (Fernet, Austina, & Vallerand, 2012). Second, Link 1.2–6–8–11 cross-sectional research shows that job resources (including cognitive, emotional, and physical resources) positively predict employee basic psychological need satisfaction and autonomous work motivation, which as mediators positively predict work effort (Cooman, Stynen, Broeck, Sels, & Witte, 2013), work engagement, and job performance (Trépanier, Forest, Fernet, & Austin, 2015).

Link 1–9–11 (2 study samples) examines the effects of job characteristics on employee controlled motivation and work behaviors and attitudes. Güntert's (2015) preliminary study shows that JCM's five core characteristics negatively predict employees' introjected and external regulation, which as mediators negatively predict job satisfaction and altruism while positively predicting turnover intention. Trépanier et al.'s (2015) cross-sectional study based on the JD-R model shows that job resources positively predict employee work engagement and performance and negatively predict psychological distress and physical symptoms through the dual mediation of basic psychological need thwarting and controlled motivation, while job demands (including cognitive, emotional, and physical demands) negatively affect employee work engagement and performance and positively affect psychological distress and physical symptoms through basic psychological need thwarting and controlled motivation. Only Güntert (2015) preliminarily shows in Link 1–10–11 that amotivation partially mediates the relationship between JCM job characteristics and employee turnover intention.

### **3.3.4. Stream 4: Effects of Supportive Work Environment on Basic Psychological Need Satisfaction (or Thwarting) and Work Behaviors and Attitudes**

#### **(1) Effects of Supportive Interpersonal Climate on Basic Psychological Needs, Work Behaviors, and Attitudes**

Link 3–6–11 (7 study samples) shows that employee basic psychological need satisfaction as a mediator partially explains the positive effects of autonomy-supportive environments (management support, supervisor support, and work environment support) on work performance and behavioral adjustment (Arshadi, 2010; Baard, Deci, & Ryan, 2004), work engagement, general self-esteem,

and the negative effect on work anxiety (Deci et al., 2001; Gagné, 2003). Employee basic psychological need satisfaction as a mediator partially explains the positive effects of supervisor autonomy support on job satisfaction, work performance, well-being, and self-actualization (Gillet, Colombat, Michinov, Pronost, & Fouquereau, 2013; Gillet, Fouquereau, Forest, Brunault, & Colombat, 2012; Oostlander et al., 2014).

Preliminary research in Link 4–6–11 shows that basic psychological need satisfaction as a mediator partially explains the positive effects of employee perceived organizational support on job satisfaction, work well-being, and self-actualization. Link 4–7–11 preliminary research shows that employee perceived organizational support negatively predicts employee basic psychological need thwarting, which as a mediator negatively predicts job satisfaction, work well-being, and self-actualization (Gillet et al., 2012).

### **(2) Effects of Job Characteristics on Basic Psychological Need Satisfaction, Work Behaviors, and Attitudes**

Link 1.2–6–11 (4 study samples) shows that employee basic psychological need satisfaction as a mediator partially explains the positive effects of job resources on work engagement and the negative effects on emotional exhaustion (Broeck, Vansteenkiste, Witte, & Lens, 2008; Trépanier et al., 2015). Basic psychological need satisfaction also explains the positive effects of personal resources (optimism and resilience) on employee mental health (Boudrias et al., 2011). Employee basic psychological need satisfaction as a mediator partially explains the positive effects of job demands (workload, emotional demands, physical demands, and work-family interference) on emotional exhaustion and the negative effects on work engagement (Albrecht, 2015; Broeck et al., 2008). Link 1.2–7–11 preliminary research shows that employee basic psychological need thwarting as a mediator partially explains the negative effects of job demands on work engagement and performance and the positive effects on psychological distress and physical health complaints, as well as the positive effects of job resources on work engagement and performance and the negative effects on psychological distress and physical health complaints (Trépanier et al., 2015).

### **(3) Effects of Leadership Styles on Basic Psychological Need Satisfaction and Work Behaviors and Attitudes**

Link 2–6–11 (6 study samples) shows: First, experimental research finds that managers' transformational leadership style promotes employee basic psychological need satisfaction, which enhances employee work engagement and performance (Kovjanic, Schuh, & Jonas, 2013). Second, cross-sectional research shows that employee basic psychological need satisfaction as a mediator partially explains the positive effects of managers' transformational leadership style on subordinates' job satisfaction, self-efficacy, and commitment to the leader (Kovjanic, Schuh, Jonas, Quaquebeke, & Dick, 2012). Third, employee-supervisor exchange quality positively predicts employee basic psychological need satisfaction, which as a mediator positively predicts affective commitment, autonomous work

motivation, job satisfaction, and vitality (Graves & Luciano, 2013). Fourth, cross-sectional research shows that employee basic psychological need satisfaction as a mediator partially explains the positive effects of servant leadership on employee job satisfaction (Mayer, Bardes, & Piccolo, 2008), task performance, and organizational citizenship behavior (Chiniara & Bentein, 2016). Fifth, authentic leadership positively predicts authentic followers' basic psychological need satisfaction, which in turn positively predicts work role performance (Leroy, Anseel, Gardner, & Sels, 2015). No research in Link 2–7–11 has examined leadership styles' effects on employee basic psychological need thwarting, work behaviors, and attitudes.

### **3.3.5. Stream 5: Research on Psychological Processes Through Which Controlling Environments Affect Work Behaviors and Attitudes**

Corresponding to autonomy-supportive environments are “controlling environments” and “amotivating environments,” though research on which factors in work environments constitute “controlling environments” or “amotivating environments” remains limited. Current scholarly attention focuses on several categories of factors: first, negative supervisor behaviors, including workplace psychological harassment, abusive supervision, and controlling behaviors by supervisors (or coaches); second, workplace bullying; third, negative job characteristics, including work stress and job demands (role ambiguity, role conflict, and emotional demands); and fourth, employees' perceptions of organizational politics.

Preliminary research in Link 5–8, Link 5–9, and Link 5–10 shows: First, supervisor “workplace psychological harassment” (i.e., subordinates being ordered to do menial work, frequently having to work overtime, having their opinions ignored by supervisors, and supervisors withholding information affecting their performance) negatively predicts subordinates' autonomous work motivation, turnover intention, and mental health while positively predicting controlled motivation (Trépanier, Fernet, & Austin, 2012). Second, research on Chinese employee samples shows that managers' abusive supervision negatively correlates with employees' autonomous safety motivation and introjected safety motivation while positively correlating with external safety motivation and amotivation (Jiang & Tetrick, 2016). Third, research on Taiwanese employee samples finds that employees' perceptions of organizational politics negatively correlate with autonomous and controlled work motivation while positively correlating with amotivation, with employee anxiety and distress only partially mediating these relationships (Cho & Yang, 2018).

Preliminary research in Link 5–8–11 shows that increased perceived work stress (from teaching staff and students, teaching workload, and student non-cooperation) significantly reduces teachers' autonomous work motivation, thereby producing stronger emotional exhaustion (Fernet, Guay, Sénécal, &

Austin, 2012; Pelletier, Lévesque, & Legault, 2002). Preliminary research in Link 5–9–11 and Link 5–10–11 finds that “coach controlling behaviors” positively predict swimmers’ external regulation and amotivation, which in turn negatively predict swimmers’ behavioral persistence after one and two years (Pelletier et al., 2001).

Preliminary research in Link 5–6–11 shows: First, employee basic psychological need satisfaction as a mediator partially explains the positive effects of workplace bullying on employee burnout and the negative effects on work engagement (Trépanier, Fernet, & Austin, 2013). Second, employee basic psychological need satisfaction fully mediates the negative relationships between employees’ perceptions of organizational politics and contextual performance and innovative work behavior (Rosen, Ferris, Brown, Chen, & Yan, 2014). Third, employee basic psychological need satisfaction plays an important mediating role in the negative relationship between negative job characteristics (role ambiguity, role conflict, and emotional demands) and employee engagement, as well as the positive relationship between negative job characteristics and emotional exhaustion (Albrecht, 2015; Broeck et al., 2008). Fourth, basic psychological need satisfaction partially mediates the positive relationship between managers’ abusive supervision and employee deviant behavior (Lian, Ferris, & Brown, 2012).

Preliminary research in Link 5–7–11 shows that basic psychological need thwarting as a mediator partially explains the negative effects of supervisors’ controlling behaviors on employee job satisfaction, well-being, and self-actualization (Gillet et al., 2012), as well as the negative effects of workplace bullying on life satisfaction and physical health complaints (time-lagged effects) (Trépanier, Fernet, & Austin, 2016). Preliminary research also shows that athletes’ basic psychological need thwarting as a mediator explains the negative effects of “coach controlling behaviors” on athletes’ burnout and negative affect (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011).

### **3.3.6. Stream 6: Psychological Processes Through Which Individual Characteristics Affect Employees**

Self-determination theory posits that employee work motivation is also influenced by individual characteristics. Current research primarily examines two aspects: general causality orientations and individuals’ pursued goals, aspirations, or work value orientations.

#### **(1) Individual Causality Orientations, Work Motivation, and Outcomes**

Deci and Ryan (1985b) propose that individuals differ in three types of causality orientations: autonomy orientation, control orientation, and impersonal orientation. Link 12.1–8–11 (4 study samples) in cross-sectional studies shows that employee autonomous causality orientation positively predicts the Relative Autonomy Index (Gillet, Huart, et al., 2013; Lam & Gurland, 2008), autonomous work motivation (Gillet, Gagné, et al., 2013), and intrinsic work motivation (Liu

et al., 2011). Employee controlling causality orientation negatively predicts the Relative Autonomy Index (Lam & Gurland, 2008). In these relationships, the Relative Autonomy Index as a mediator partially explains the positive effects of employee autonomous causality orientation on job satisfaction and organizational commitment (Lam & Gurland, 2008) and work engagement (Gillet, Huart, et al., 2013), while autonomous work motivation as a mediator explains the positive effects of employee autonomous causality orientation on job satisfaction (Gillet, Gagné, et al., 2013) and the negative effects on turnover intention (Liu et al., 2011; Gillet, Gagné, et al., 2013). No research in Link 12.1–9–11 has examined the effects of individual causality orientations on controlled motivation, employee behaviors, and attitudes. No research in Link 12.1–10–11 has examined the effects of individual causality orientations on employee amotivation, work behaviors, and attitudes.

## **(2) Effects of Individual Work Goals or Value Orientations on Basic Psychological Need Satisfaction, Work Behaviors, and Attitudes**

Self-determination theory focuses on how goals, value orientations, or aspirations that employees hold or pursue in the workplace affect mental health and behavior. Factor analysis research shows that employees' work goals or value orientations can be divided into two categories: extrinsic goals or value orientations, including wealth, recognition or fame, and attractive appearance; and intrinsic goals or value orientations, including personal development, meaningful relationships, community contribution, and physical health. When employees value extrinsic goals more than intrinsic goals or pursue these extrinsic goals, they experience more depression, anxiety, low self-esteem, and burnout. When employees value intrinsic goals more or pursue these intrinsic goals, they experience higher self-actualization and self-esteem (Kasser & Ryan, 1996).

Link 12.2–6–11 (2 study samples) shows that employees' three basic psychological need satisfactions play an important mediating role in relationships between employees' relative work value orientations and work behaviors, attitudes, and mental health. Compared to intrinsic work value orientations, the more employees value extrinsic work values, the lower their basic psychological need satisfaction, which as a mediator positively predicts job satisfaction, work dedication, and vitality while negatively predicting emotional exhaustion, turnover intention, and work-family conflict (Vansteenkiste et al., 2007). Compared to extrinsic work values, the more teams value intrinsic work values, the higher team members' basic psychological need satisfaction, which as a mediator positively predicts team members' work engagement (Schreurs, Emmerik, Broeck, & Guenter, 2014).

## **4.1. Contributions of Work Motivation Research Based on Self-Determination Theory**

Self-determination theory provides a new theoretical framework for work motivation research, moving beyond the traditional intrinsic-extrinsic motivation

dichotomy, emphasizing the positive role of human value internalization, identifying different behavioral regulation types of extrinsic motivation, proposing that different motivation types have different antecedents and consequences, and empirically testing the antecedents of different motivation types and their predictive effects on employee work behaviors, attitudes, and mental health, thereby advancing work motivation research into deeper and broader domains. The above stream analysis shows that autonomous work motivation, comprising intrinsic motivation and autonomous extrinsic motivation, positively predicts employee work behaviors, attitudes, and mental health, while amotivation and controlled motivation may strongly predict negative employee work behaviors and attitudes.

Empirical research on work motivation based on self-determination theory also supports that the three basic psychological needs for autonomy, competence, and relatedness are essential psychological conditions for employee growth, positive behaviors, and mental health. The empirically tested three basic needs theory has advanced fundamental theoretical research on work motivation. Stream analysis conclusions also verify the explanatory power of self-determination theory's core hypotheses when applied to organizational management environments, demonstrating that environments satisfying employees' three basic psychological needs can enhance intrinsic motivation, promote internalization and integration of extrinsic motivation, and thereby positively affect employee work behaviors, attitudes, and mental health.

Stream analysis and synthesis also demonstrate the motivational potential of work characteristics, leadership styles (transformational leadership, authentic leadership, leader-member exchange, servant leadership, etc.), autonomy-supportive interpersonal climates, and perceived organizational support. Work motivation research based on self-determination theory reveals the internal psychological processes through which work environmental factors affect employees, advancing research in job characteristics theory, leadership theory, and organizational support theory.

#### **4.2. Future Directions for Work Motivation Research Based on Self-Determination Theory**

Stream analysis reveals that only a few studies have examined how specific factors in controlling environments affect employee basic psychological need thwarting, controlled motivation, amotivation, and employee attitudes and behaviors. In other words, insufficient empirical evidence has accumulated regarding the effects of basic psychological need thwarting on employee work motivation, work behaviors, and attitudes, limiting the explanatory power of self-determination theory.

Self-determination theory posits that intrinsic motivation and autonomous extrinsic motivation (identified and integrated regulation) have different psychological mechanisms, yet only a few studies have preliminarily examined the dif-

ferential effects of intrinsic motivation and identified regulation on employees. Preliminary evidence suggests that identified regulation more strongly predicts work performance than intrinsic motivation (Burton et al., 2006; Zhang et al., 2016). Second, the effects of intrinsic motivation or identified regulation on behavioral performance may be moderated by task characteristics (Koestner & Losier, 2002) and mediated by affect (Gillet, Vallerand, Lafrenière, & Bureau, 2013) and goal attainment (Cerasoli & Ford, 2014). Therefore, future research should deeply explore the differential effects and processes of intrinsic motivation and identified regulation on employee work performance, behaviors, and attitudes under different contextual conditions (task characteristics, time requirements, etc.).

Recent research shows that basic psychological need thwarting and basic psychological need satisfaction are independent yet coexisting concepts, and basic psychological need thwarting may better predict employee controlled motivation or amotivation (Longo et al., 2016). Stream analysis reveals limited research on relationships between employee basic psychological need thwarting and other variables. Therefore, to further explore the psychological conditions of controlled motivation and amotivation and their effects on negative employee behaviors, the antecedents, motivational processes, and outcomes of basic psychological need thwarting require in-depth study. Specifically, Link 5–7–11, Link 5–9–11, and Link 5–10–11 represent key future research directions. First, more attention should be paid to which factors in work environments have controlling characteristics (leadership styles such as destructive leadership and paternalistic leadership with Chinese cultural characteristics, interpersonal aspects such as workplace ostracism and interpersonal conflict, organizational climate aspects such as organizational injustice). Second, research should focus on whether these controlling environmental factors have causal relationships with employee basic psychological need thwarting, controlled work motivation or amotivation, and employee behaviors and attitudes. Third, future research should also deeply explore which other factors in work environments (organizational justice, company policies, human resource management practices such as performance appraisal and feedback) have motivational potential and whether they affect employees' three basic psychological need satisfaction and work motivation.

Self-determination theory originated from Deci and Ryan's research on how external rewards affect intrinsic motivation, proposing contextual conditions for these effects, though their conclusions have generated extensive debate. Scholars argue that Deci and Ryan's laboratory research on student samples differs substantially from employees' work situations in organizations, and their conclusions cannot be universally applied to workplaces (Eisenberger & Cameron, 1996). Based on behaviorist and expectancy-value theories, using compensation incentives or external rewards is common practice in workplaces, but what effects these practices have on employee autonomous motivation requires in-depth research. Currently, only a few studies have addressed this issue. For example, Gubler, Larkin, and Pierce's (2016) intervention study shows that monetary rewards enhance controlled motivation and produce spillover effects, reducing

employees' autonomous motivation for unrewarded tasks. Cerasoli, Nicklin, and Ford's (2014) meta-analysis shows that when external rewards are salient, the correlation between intrinsic motivation and work performance is weaker, whereas when external rewards are not salient, the correlation is stronger. They also find that intrinsic motivation significantly predicts the quality of activity outcomes, while external rewards significantly predict the quantity of outcomes. Kuvaas, Buch, Gagné, Dysvik, and Forest's (2016) longitudinal study shows that controlled motivation partially mediates the negative relationship between employees' performance-based rewards and work effort, while autonomous work motivation fully mediates the negative relationship between employees' annual performance rewards and work effort. Olafsen, Halvari, Forest, and Deci's (2015) study shows that employee compensation level and distributive justice perception are unrelated to employee basic psychological need satisfaction and intrinsic motivation, while Kuvaas et al. (2016) find that performance-unrelated base pay positively correlates with autonomous motivation and is unrelated to controlled motivation. These preliminary conclusions require more empirical research for confirmation. Therefore, the effects of external rewards (including compensation and performance-based incentives) on employees' different motivations, basic psychological need satisfaction, performance, and mental health, along with their boundary conditions, require in-depth study.

Most current work motivation measurements use self-report subjective evaluations and do not include integrated regulation and amotivation types (Zhang et al., 2016; Gagné et al., 2015), which may bias research results. Future research should improve work motivation measurement techniques, develop objective measurement tools suitable for work motivation research, and also develop basic psychological need thwarting measurement tools to advance research on antecedents and consequences of basic psychological need thwarting.

### **4.3. Practical Value of Work Motivation Research Based on Self-Determination Theory**

Work motivation research based on self-determination theory shows that organizational environments satisfying employees' three basic psychological needs can enhance and maintain intrinsic motivation and promote internalization and integration of extrinsic motivation. In organizational management practice, policies and practices for improving organizational environments should aim to help employees feel competence enhancement, become more competent and confident, experience freedom for autonomous trial and action rather than feeling pressured or forced to work through command, and experience respect and belonging.

Organizations can conduct interventions to enhance autonomy-supportive behaviors among managers or team members to improve management or interaction behaviors. Specifically, interventions can be implemented in the following aspects: supervisors or team members understanding different opinions from subordinates or peers, encouraging autonomous action, providing choice opportunities and positive feedback, assigning optimally challenging tasks, and

providing rationales for required behaviors.

Work motivation research based on self-determination theory also demonstrates the motivational potential of job characteristics. Organizational management practice can improve employee work motivation through optimal job design. First, applying the Job Characteristics Model (JCM) to optimize design across five dimensions—task significance, task identity, skill variety, job feedback, and autonomy—enhances employee autonomous work motivation. Second, applying the Job Demands-Resources (JD-R) Model to optimize jobs by increasing job resources and reducing energy-depleting job demands.

Work motivation research based on self-determination theory further confirms the motivational potential of leadership styles in motivating employees. Management practice can implement interventions based on improving leadership behaviors, encouraging leaders to adopt more transformational or servant leadership behaviors and improve relationship quality with subordinates to stimulate employee autonomous work motivation.

## Acknowledgments

We thank the reviewers and Dr. Wu Xiaojie for their suggestions on revising this paper.

- indicates literature used in stream analysis

Liu, J., Zhong, B., & Si, G. (2013). Application of self-determination theory in Chinese populations. *Advances in Psychological Science*, 21(10), 1803-1813.

Zhang, J., Zhang, J., Li, Y., & Deci, E. L. (2010). Effective pathways to promoting work motivation: A self-determination theory perspective. *Advances in Psychological Science*, 18(5), 794-802.

Albrecht, S. L. (2015). *Challenge demands, hindrance demands, and psychological need satisfaction: Their influence on employee engagement and emotional exhaustion*. *Journal of Personnel Psychology\**, 14(2), 70-79.

Arshadi, N. (2010). *Basic need satisfaction, work motivation, and job performance in an industrial company in Iran*. *Procedia - Social and Behavioral Sciences\**, 5, 1267-1272.

Baard, P. P., Deci, E. L., & Ryan, R. M. (2004). *Intrinsic need satisfaction: A motivational basis of performance and well-being in two work settings*. *Journal of Applied Social Psychology\**, 34(10), 2045-2068.

Bartholomew, K. J., Ntoumanis, N., Ryan, R. M., Bosch, J. A., & Thøgersen-Ntoumani, C. (2011). *Self-determination theory and diminished functioning: The role of interpersonal control and psychological need thwarting*. *Personality & Social Psychology Bulletin\**, 37(11), 1459-1473.

Battistelli, A., Galletta, M., Portoghese, I., & Vandenberghe, C. (2013). *Mindsets of commitment and motivation: Interrelationships and contribution to work*

outcomes. *Journal of Psychology\**, 147(1), 17-48.

Beek, I. V., Hu, Q., Schaufeli, W. B., Taris, T. W., & Schreurs, B. H. J. (2012). For fun, love, or money: What drives workaholic, engaged, and burnout employees at work? *Applied Psychology\**, 61(1), 30-55.

Beek, I. V., Taris, T. W., & Schaufeli, W. B. (2011). Workaholic and work engaged employees: Dead ringers or worlds apart? *Journal of Occupational Health Psychology\**, 16(4), 468-482.

Bidee, J., Pepermans, R., Huybrechts, G., Willems, J., Jegers, M., & Hofmans, J. (2013). Autonomous motivation stimulates volunteers' work effort: A self-determination theory approach to volunteerism. *Voluntas International Journal of Voluntary & Nonprofit Organizations\**, 24(1), 32-47.

Blais, M. R., Brière, N. M., Lachance, L., Riddle, A. S., & Vallerand, R. J. (1993). *L' inventaire des motivations au travail de Blais* [The Blais Inventory of Work Motivation]. *Revue Québécoise de Psychologie*, 14(3), 185-215.

Bono, J. E., & Judge, T. A. (2003). Self-concordance at work: Toward understanding the motivational effects of transformational leaders. *Academy of Management Journal\**, 46(5), 554-571.

Boudrias, J. S., Desrumaux, P., Gaudreau, P., Nelson, K., Brunet, L., & Savoie, A. (2011). Modeling the experience of psychological health at work: The role of personal resources, social-organizational resources, and job demands. *International Journal of Stress Management\**, 18(4), 372-395.

Broeck, A. V. D., Vansteenkiste, M., Witte, H. D., & Lens, W. (2008). Explaining the relationships between job characteristics, burnout, and engagement: The role of basic psychological need satisfaction. *Work & Stress\**, 22(3), 277-294.

Broeck, A. V. D., Ferris, D. L., Chang, C. H., & Rosen, C. C. (2016). A review of self-determination theory's basic psychological needs at work. *Journal of Management\**, 42(5), 1195-1229.

Broeck, A. V. D., Lens, W., Witte, H. D., & Coillie, H. V. (2013). Unraveling the importance of the quantity and the quality of workers' motivation for well-being: A person-centered perspective. *Journal of Vocational Behavior\**, 82(1), 69-78.

Broeck, A. V. D., Schreurs, B., Witte, H. D., Vansteenkiste, M., Germeyns, F., & Schaufeli, W. (2011). Understanding workaholics' motivations: A self-determination perspective. *Applied Psychology\**, 60(4), 600-621.

Broeck, A. V. D., Vansteenkiste, M., Witte, H. D., Soenens, B., & Lens, W. (2010). Capturing autonomy, competence, and relatedness at work: Construction and initial validation of the work-related basic need satisfaction scale. *Journal of Occupational & Organizational Psychology\**, 83(4), 981-1000.

- Burton, K. D., Lydon, J. E., Alessandro, D. U., & Koestner, R. (2006). The differential effects of intrinsic and identified motivation on well-being and performance: Prospective, experimental, and implicit approaches to self-determination theory. *Journal of Personality & Social Psychology*, 91(4), 750-762.
- Cerasoli, C. P., & Ford, M. T. (2014). Intrinsic motivation, performance, and the mediating role of mastery goal orientation: A test of self-determination theory. *Journal of Psychology*, 148(3), 267-286.
- Cerasoli, C. P., Nicklin, J. M., & Ford, M. T. (2014). Intrinsic motivation and extrinsic incentives jointly predict performance: A 40-year meta-analysis. *Psychological Bulletin*, 140(4), 980-1008.
- Chambel, M. J., Castanheira, F., Oliveiracruz, F., & Lopes, S. (2015). Work context support and Portuguese soldiers' well-being: The mediating role of autonomous motivation. *Military Psychology\**, 27(5), 297-310.
- Chen, C. Y., Chen, C. H., & Li, C. I. (2013). The influence of leader's spiritual values of servant leadership on employee motivational autonomy and eudaemonic well-being. *Journal of Religion & Health\**, 52(2), 418-438.
- Chiniara, M., & Bentein, K. (2016). Linking servant leadership to individual performance: Differentiating the mediating role of autonomy, competence and relatedness need satisfaction. *Leadership Quarterly\**, 27(1), 124-141.
- Cho, H. T., & Yang, J. S. (2018). How perceptions of organizational politics influence self-determined motivation: The mediating role of work mood. *Asia Pacific Management Review\**, 23, 60-69.
- Conchie, S. M. (2013). Transformational leadership, intrinsic motivation, and trust: A moderated-mediated model of workplace safety. *Journal of Occupational Health Psychology\**, 18(2), 198-210.
- Cooman, R. D., Stynen, D., Broeck, A. V. D., Sels, L., & Witte, H. D. (2013). How job characteristics relate to need satisfaction and autonomous motivation: Implications for work effort. *Journal of Applied Social Psychology\**, 43(6), 1334-1345.
- Deci, E. L., Connell, J. P., & Ryan, R. M. (1989). Self-determination in a work organization. *Journal of Applied Psychology*, 74(4), 580-590.
- Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, 125(6), 692-700.
- Deci, E. L., Olafsen, A. H., & Ryan, R. M. (2017). Self-determination theory in work organizations: The state of a science. *The Annual Review of Organizational Psychology and Organizational Behavior*, 4(1), 19-43.
- Deci, E. L., & Ryan, R. M. (1985a). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

Deci, E. L., & Ryan, R. M. (1985b). The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality*, 19(2), 109-134.

Deci, E. L., & Ryan, R. M. (1987). The support of autonomy and the control of behavior. *Journal of Personality and Social Psychology*, 53(6), 1024-1037.

Deci, E. L., Ryan, R. M., Gagné, M., Leone, D. R., Usunov, J., & Kornazheva, B. P. (2001). *Need satisfaction, motivation, and well-being in the work organizations of a former eastern bloc country: A cross-cultural study of self-determination*. *Personality & Social Psychology Bulletin*\*, 27(8), 930-942.

Demerouti, E., Nachreiner, F., Bakker, A. B., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, 86(3), 499-512.

Dysvik, A., Kuvaas, B., & Gagné, M. (2013). *An investigation of the unique, synergistic and balanced relationships between basic psychological needs and intrinsic motivation*. *Journal of Applied Social Psychology*\*, 43(5), 1050-1064.

Eisenberger, R., & Cameron, J. (1996). Detrimental effects of reward: Reality or myth? *American Psychologist*, 51(11), 1153-1166.

Eisenberger, R., & Stinglhamber, F. (2011). *Perceived organizational support: Fostering enthusiastic and productive employees*. Washington, DC: American Psychological Association Books.

Eyal, O., & Roth, G. (2011). *Principals' leadership and teachers' motivation: Self-determination theory analysis*. *Journal of Educational Administration*\*, 49(3), 256-275.

Fernet, C., Austin, S., & Vallerand, R. J. (2012). *The effects of work motivation on employee exhaustion and commitment: An extension of the JD-R model*. *Work & Stress*\*, 26(3), 213-229.

Fernet, C., Guay, F., Senécal, C., & Austin, S. (2012). *Predicting intraindividual changes in teacher burnout: The role of perceived school environment and motivational factors*. *Teaching & Teacher Education an International Journal of Research & Studies*\*, 28(4), 514-525.

Fernet, C., Trépanier, S. G., Austin, S., Gagné, M., & Forest, J. (2015). *Transformational leadership and optimal functioning at work: On the mediating role of employees' perceived job characteristics and motivation*. *Work & Stress*\*, 29(1), 11-31.

Gagné, M. (2003). *The role of autonomy support and autonomy orientation in prosocial behavior engagement*. *Motivation & Emotion*\*, 27(3), 199-223.

Gagné, M., & Deci, E. L. (2005). The Self-determination theory and work motivation. *Journal of Organizational Behavior*, 26(4), 331-362.

Gagné, M., Chemolli, E., Forest, J., & Koestner, R. (2008). *A temporal analysis of the relation between organizational commitment and work motivation*. *Psychologica Belgica\**, 48(2-3), 219-241.

Gagné, M., Forest, J., Gilbert, M. H., Aubé, C., Morin, E., & Malorni, A. (2010). *The motivation at work scale: Validation evidence in two languages*. *Educational and Psychological Measurement\**, 70(4), 628-646.

Gagné, M., Forest, J., Vansteenkiste, M., Crevier-Braud, L., Broeck, A. V. D., Aspley, A. K., ... Westbye, C. (2015). *The multidimensional work motivation scale: Validation evidence in seven languages and nine countries*. *European Journal of Work & Organizational Psychology\**, 24(2), 178-196.

Galletta, M., Portoghese, I., & Battistelli, A. (2011). *Intrinsic motivation, job autonomy and turnover intention in the Italian healthcare: The mediating role of affective commitment*. *Journal of Management Research\**, 3(2), 1-19.

Gillet, N., Becker, C., Lafrenière, M. A., Huart, I., & Fouquereau, E. (2017). *Organizational support, job resources, soldiers' motivational profiles, work engagement, and affect*. *Military Psychology\**, 29(5), 418-433.

Gillet, N., Colombat, P., Michinov, E., Pronost, A. M., & Fouquereau, E. (2013). *Procedural justice, supervisor autonomy support, work satisfaction, organizational identification and job performance: The mediating role of need satisfaction and perceived organizational support*. *Journal of Advanced Nursing\**, 69(11), 2560-2571.

Gillet, N., Forest, J., Brunault, P., & Colombat, P. (2012). *The impact of organizational factors on psychological needs and their relations with well-being*. *Journal of Business & Psychology\**, 27(4), 437-450.

Gillet, N., Fouquereau, E., Lafrenière, M. A. K., & Huyghebaert, T. (2016). *Examining the roles of work autonomous and controlled motivations on satisfaction and anxiety as a function of role ambiguity*. *Journal of Psychology\**, 150(5), 644-665.

Gillet, N., Gagné, M., Sauvagère, S., & Fouquereau, E. (2013). *The role of supervisor autonomy support, organizational support, and autonomous and controlled motivation in predicting employees' satisfaction and turnover intentions*. *European Journal of Work & Organizational Psychology\**, 22(4), 450-460.

Gillet, N., Huart, I., Colombat, P., & Fouquereau, E. (2013). *Perceived organizational support, motivation, and engagement among police officers*. *Professional Psychology Research & Practice\**, 44(1), 46-55.

Gillet, N., Vallerand, R. J., Lafrenière, M. A. K., & Bureau, J. S. (2013). *The mediating role of positive and negative affect in the situational motivation-performance relationship*. *Motivation & Emotion*, 37(3), 465-479.

Gilbert, S. L., & Kelloway, E. K. (2014). *Leadership*. In M. Gagné (Eds.), *The Oxford handbook of work engagement, motivation, and self-determination theory*

(pp. 181-198). New York, the United States of America: Oxford University Press.

Graves, L. M., Cullen, K. L., Lester, H. F., Ruderman, M. N., & Gentry, W. A. (2015). *Managerial motivational profiles: Composition, antecedents, and consequences*. *Journal of Vocational Behavior*\*, 87(87), 32-42.

Graves, L. M., & Luciano, M. M. (2013). *Self-determination at work: Understanding the role of leader-member exchange*. *Motivation & Emotion*\*, 37(3), 518-536.

Grolnick, W. S., & Ryan, R. M. (1987). *Autonomy in children's learning: An experimental and individual difference investigation*. *Journal of Personality and Social Psychology*, 52(5), 890-898.

Gubler, T., Larkin, I., & Pierce, L. (2016). *Motivational spillovers from awards: Crowding out in a multitasking environment*. *Organization Science*, 27(2), 233-504.

Güntert, S. T. (2015). *The impact of work design, autonomy support, and strategy on employee outcomes: A differentiated perspective on self-determination at work*. *Motivation & Emotion*\*, 39(1), 74-87.

Hackman, R. J., & Oldham, G. R. (1980). *Work redesign*. San Francisco, CA: Addison Wesley.

Haivas, S., Hofmans, J., & Pepermans, R. (2013). *Volunteer engagement and intention to quit from a self-determination theory perspective*. *Journal of Applied Social Psychology*\*, 43(9), 1869-1880.

Hardré, P. L., & Reeve, J. (2010). *Training corporate managers to adopt a more autonomy-supportive motivating style toward employees: An intervention study*. *International Journal of Training & Development*\*, 13(3), 165-184.

Hon, A. H. Y. (2012). *Shaping environments conducive to creativity: The role of intrinsic motivation*. *Cornell Hospitality Quarterly*\*, 53(1), 53-64.

Howard, J., Gagné, M., Morin, A. J. S., & Broeck, A. V. D. (2016). *Motivation profiles at work: A self-determination theory approach*. *Journal of Vocational Behavior*\*, 95, 74-89.

Ilardi, B. C., Leone, D., Kasser, T., & Ryan, R. M. (1993). *Employee and supervisor ratings of motivation: Main effects and discrepancies associated with job satisfaction and adjustment in a factory setting*. *Journal of Applied Social Psychology*\*, 23(21), 1789-1905.

Imran, R., Allil, K., & Mahmoud, A. B. (2017). *Teacher's turnover intentions: Examining the impact of motivation and organizational commitment*. *International Journal of Educational Management*, 31(6), 828-842.

Jiang, L., & Tetrick, L. E. (2016). *Mapping the nomological network of employee self-determined safety motivation: A preliminary measure in China*. *Accident*

Analysis & Prevention\*, 94, 1-7.

Joo, B. K., Jeung, C. W., & Yoon, H. J. (2010). *Investigating the influences of core self-evaluations, job autonomy, and intrinsic motivation on in-role job performance*. *Human Resource Development Quarterly\**, 21(4), 353-371.

Jungert, T., Broeck, A. V. D., Schreurs, B., & Osterman, U. (2018). *How colleagues can support each other's needs and motivation: An intervention on employee work motivation*. *Applied Psychology: An International Review\**, 67(1), 3-29.

Jungert, T., Koestner, R. F., Houliort, N., & Schattke, K. (2013). *Distinguishing source of autonomy support in relation to workers' motivation and self-efficacy*. *Journal of Social Psychology\**, 153(6), 651-666.

Kasser, T., & Ryan, R. M. (1996). Further examining the American dream: Differential correlates of intrinsic and extrinsic goals. *Personality & Social Psychology Bulletin*, 22(3), 280-287.

Koestner, R., & Losier, G. (2002). Distinguishing three ways of being internally motivated: A closer look at introjection, identification, and intrinsic motivation. In E. Deci & R. Ryan (Eds.), *Handbook of self-determination research* (pp. 101-121). Rochester, NY: University of Rochester Press.

Kovjanic, S., Schuh, S. C., & Jonas, K. (2013). *Transformational leadership and performance: An experimental investigation of the mediating effects of basic needs satisfaction and work engagement*. *Journal of Occupational & Organizational Psychology\**, 86(4), 543-555.

Kovjanic, S., Schuh, S. C., Jonas, K., Quaquebeke, N. V., & Dick, R. V. (2012). *How do transformational leaders foster positive employee outcomes? A self-determination-based analysis of employees' needs as mediating links*. *Journal of Organizational Behavior\**, 33(8), 1031-1052.

Kuvaas, B. (2008). *A test of hypotheses derived from self-determination theory among public sector employees*. *Employee Relations\**, 31(1), 39-56.

Kuvaas, B., Buch, R., Gagne, M., Dysvik, A., & Forest, J. (2016). Do you get what you pay for? Sales incentives and implications for motivation and changes in turnover intention and work effort. *Motivation & Emotion*, 40(5), 667-680.

Lam, C. F., & Gurland, S. T. (2008). *Self-determined work motivation predicts job outcomes, but what predicts self-determined work motivation?* *Journal of Research in Personality\**, 42(4), 1109-1115.

Leroy, H., Anseel, F., Gardner, W. L., & Sels, L. (2015). *Authentic leadership, authentic followership, basic need satisfaction, and work role performance: A cross-level study*. *Journal of Management\**, 41(6), 1677-1697.

Lian, H., Ferris, D. L., & Brown, D. J. (2012). *Does taking the good with the bad make things worse? How abusive supervision and leader-member exchange*

*interact to impact need satisfaction and organizational deviance. Organizational Behavior & Human Decision Processes\**, 117(1), 41-52.

*Li, C., Wu, Y., & Ying, H. K. (2016). Validation of the volunteer motivation scale and its relations with work climate and intention among Chinese volunteers. Asian Journal of Social Psychology\**, 19(2), 124-133.

*Liu, D., Zhang, S., Wang, L., & Lee, T. W. (2011). The effects of autonomy and empowerment on employee turnover: Test of a multilevel model in teams. Journal of Applied Psychology\**, 96(6), 1305-1316.

*Lopes, S., & Chambel, M. J. (2017). Temporary agency workers' motivations and well-being at work: A two-wave study. International Journal of Stress Management\**, 24(4), 321-346.

*Longo, Y., Gunz, A., Curtis, G. J., & Farsides, T. (2016). Measuring need satisfaction and frustration in educational and work contexts: The need satisfaction and frustration scale (NSFS). Journal of Happiness Studies\**, 17(1), 1-23.

*Lynch, M. F., Plant, R. W., & Ryan, R. M. (2005). Psychological needs and threat to safety: Implications for staff and patients in a psychiatric hospital for youth. Professional Psychology Research & Practice\**, 36(4), 415-425.

*Martinet, G., Guillaud-Descas, E., & Moiret, S. (2015). Reliability and validity evidence for the French psychological need thwarting scale (PNTS) scores: Significance of a distinction between thwarting and satisfaction of basic psychological needs. Psychology of Sport & Exercise\**, 20, 29-39.

*Mayer, D. M., Bardes, M., & Piccolo, R. F. (2008). Do servant-leaders help satisfy follower needs? An organizational justice perspective. European Journal of Work & Organizational Psychology\**, 17(2), 180-197.

*Millette, V., & Gagné, M. (2008). Designing volunteers' tasks to maximize motivation, satisfaction and performance: The impact of job characteristics on volunteer engagement. Motivation & Emotion\**, 32(1), 11-22.

*Milyavskaya, M., & Koestner, R. (2011). Psychological needs, motivation, and well-being: A test of self-determination theory across multiple domains. Personality & Individual Differences\**, 50(3), 387-391.

*Moran, C. M., Diefendorff, J. M., Kim, T. Y., & Liu, Z. Q. (2012). A profile approach to self-determination theory motivations at work. Journal of Vocational Behavior\**, 81(3), 354-363.

*Moreau, E., & Mageau, G. (2012). The importance of perceived autonomy support for the psychological health and work satisfaction of health professionals: Not only supervisors count, colleagues too! Motivation and Emotion*, 36(3), 268-286.

*Nencini, A., Romaioli, D., & Meneghini, A. M. (2016). Volunteer motivation and organizational climate: Factors that promote satisfaction and sustained*

*volunteerism in NPOS*. *Voluntas International Journal of Voluntary & Nonprofit Organizations\**, 27(2), 618-639.

Nie, Y., Chua, B. L., Yeung, A. S., Ryan, R. M., & Chan, W. Y. (2015). *The importance of autonomy support and the mediating role of work motivation for well-being: Testing self-determination theory in a Chinese work organization*. *International Journal of Psychology\**, 50(4), 245-255.

Olafsen, A. H., Deci, E. L., & Halvari, H. (2018). *Basic psychological needs and work motivation: A longitudinal test of directionality*. *Motivation & Emotion\**, 42(2), 178-189.

Olafsen, A. H., Halvari, H., Forest, J., & Deci, E. L. (2015). *Show them the money? The role of pay, managerial need support, and justice in a self-determination theory model of intrinsic work motivation*. *Scandinavian Journal of Psychology\**, 56(4), 447-457.

Oostlander, J., Güntert, S. T., & Wehner, T. (2014). *Linking autonomy-supportive leadership to volunteer satisfaction: A self-determination theory perspective*. *Voluntas International Journal of Voluntary & Nonprofit Organizations\**, 25(6), 1-17.

Otis, N., & Pelletier, L. G. (2005). *A motivational model of daily hassles, physical symptoms, and future work intentions among police officers*. *Journal of Applied Social Psychology\**, 35(10), 2193-2214.

Pauli, J., Chambel, M. J., Capellari, M. R., & Rissi, V. (2017). *Motivation, organizational support and satisfaction with life for private sector teachers in Brazilian higher education*. *Higher Education Quarterly\**, 72(2), 107-120.

Pelletier, L. G., Fortier, M. S., Vallerand, R. J., & Brière, N. M. (2001). *Associations among perceived autonomy support, forms of self-regulation, and persistence: A prospective study*. *Motivation & Emotion\**, 25(4), 279-306.

Pelletier, L. G., Séguin-lévesque, C., & Legault, L. (2002). *Pressure from above and pressure from below as determinants of teachers' motivation and teaching behaviors*. *Journal of Educational Psychology\**, 94(1), 186-196.

Piccolo, R. F., & Colquitt, J. A. (2006). *Transformational leadership and job behaviors: The mediating role of core job characteristics*. *Academy of Management Journal\**, 49(2), 327-340.

Pinder, C. C. (2008). *Work motivation in organizational behavior* (2nd ed.). New York: Psychology Press.

Rasskazova, E., Ivanova, T., & Sheldon, K. (2016). *Comparing the effects of low-level and high-level worker need-satisfaction: A synthesis of the self-determination and Maslow need theories*. *Motivation & Emotion\**, 40(4), 541-555.

Richer, S. F., Blanchard, C., & Vallerand, R. J. (2002). *A motivational model of work turnover*. *Journal of Applied Social Psychology\**, 32(10), 2089-2113.

Roche, M., & Haar, J. M. (2013). *A metamodel approach towards self-determination theory: A study of New Zealand managers' organizational citizenship behaviors*. *International Journal of Human Resource Management\**, 24(18), 3397-3417.

Rosen, C. C., Ferris, D. L., Brown, D. J., Chen, Y., & Yan, M. (2014). *Perceptions of organizational politics: A need satisfaction paradigm*. *Organization Science\**, 25(4), 1026-1055.

Ryan, R. M., & Deci, E. L. (2000a). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, 25(1), 54-67.

Ryan, R. M., & Deci, E. L. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68-78.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development and wellness*. New York: Guilford Press.

Schie, S. V., Güntert, S. T., Oostlander, J., & Wehner, T. (2015). *How the organizational context impacts volunteers: A differentiated perspective on self-determined motivation*. *Voluntas International Journal of Voluntary & Non-profit Organizations\**, 26(4), 1570-1590.

Schreurs, B., Van Emmerik, I. H., Broeck, A. V. D., & Guenter, H. (2014). *Work values and work engagement within teams: The mediating role of need satisfaction*. *Group Dynamics: Theory Research & Practice\**, 18(4), 267-281.

Silva, M. N., Sánchezoliva, D., Brunet, J., Williams, G. C., Teixeira, P. J., & Palmeira, A. L. (2017). "What goes around comes around": Antecedents, mediators, and consequences of controlling vs. need-supportive motivational strategies used by exercise professionals. *Annals of Behavioral Medicine\**, 51(5), 707-717.

Tremblay, M. A., Blanchard, C. M., Taylor, S., Pelletier, L. G., & Villeneuve, M. (2009). *Work extrinsic and intrinsic motivation scale: Its value for organizational psychology research*. *Canadian Journal of Behavioral Science\**, 41(4), 213-226.

Trépanier, S. G., Fernet, C., & Austin, S. (2012). *Workplace psychological harassment in Canadian nurses: A descriptive study*. *Journal of Health Psychology\**, 18(3), 383-396.

Trépanier, S. G., Fernet, C., & Austin, S. (2013). *Workplace bullying and psychological health at work: The mediating role of satisfaction of needs for autonomy, competence and relatedness*. *Work & Stress\**, 27(2), 123-140.

Trépanier, S. G., Forest, J., Fernet, C., & Austin, S. (2015). *On the psychological and motivational processes linking job characteristics to employee*

*functioning: Insights from self-determination theory.* *Work & Stress\**, 29(3), 286-305.

Trépanier, S. G., Fernet, C., & Austin, S. (2016). *Longitudinal relationships between workplace bullying, basic psychological needs, and employee functioning: A simultaneous investigation of psychological need satisfaction and frustration.* *European Journal of Work & Organizational Psychology\**, 25(5), 690-706.

Tu, Y., & Lu, X. (2013). *How ethical leadership influence employees' innovative work behavior: A perspective of intrinsic motivation.* *Journal of Business Ethics\**, 116(2), 441-455.

Vandercammen, L., Hofmans, J., & Theuns, P. (2014). *The mediating role of affect in the relationship between need satisfaction and autonomous motivation.* *Journal of Occupational & Organizational Psychology\**, 87(1), 62-79.

Vansteenkiste, M., Neyrinck, B., Niemiec, C. P., Soenens, B., Witte, H. D., & Broeck, A. V. D. (2007). *On the relations among work value orientations, psychological need satisfaction and job outcomes: A self-determination theory approach.* *Journal of Occupational & Organizational Psychology\**, 80(2), 251-277.

Wang, Z., & Gagné, M. (2013). *A Chinese-Canadian cross-cultural investigation of transformational leadership, autonomous motivation, and collectivistic value.* *Journal of Leadership & Organizational Studies\**, 20(1), 134-142.

Williams, G. C., Halvari, H., Niemiec, C. P., Olafsen, A. H., & Westbye, C. (2014). *Managerial support for basic psychological needs, somatic symptom burden and work-related correlates: A self-determination theory perspective.* *Work & Stress\**, 28(4), 404-419.

Zhang, Y., & Chen, C. C. (2013). *Developmental leadership and organizational citizenship behavior: Mediating effects of self-determination, supervisor identification, and organizational identification.* *Leadership Quarterly\**, 24(4), 534-543.

Zhang, J., Zhang, Y., Song, Y., & Gong, Z. (2016). *The different relations of extrinsic, introjected, identified regulation and intrinsic motivation on employees' performance: Empirical studies following self-determination theory.* *Management Decision\**, 54(10), 2393-2412.

*Note: Figure translations are in progress. See original paper for figures.*

*Source: ChinaXiv – Machine translation. Verify with original.*